

(19)



(11)

EP 2 654 093 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
28.11.2018 Bulletin 2018/48

(51) Int Cl.:
H01L 33/64 ^(2010.01) **H01L 33/62** ^(2010.01)
H01L 33/00 ^(2010.01) **H01L 33/48** ^(2010.01)

(21) Application number: **13163043.6**

(22) Date of filing: **10.04.2013**

(54) Package and method for manufacturing package

Verpackung und Verfahren zur Herstellung einer Verpackung

Emballage et procédé de fabrication de boîtier

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

(30) Priority: **19.04.2012 JP 2012095488**

(43) Date of publication of application:
23.10.2013 Bulletin 2013/43

(73) Proprietor: **Shinko Electric Industries Co., Ltd.
Nagano-shi, Nagano 381-2287 (JP)**

(72) Inventors:
• **Okabe, Toshiyuki
NAGANO, Nagano 381-2287 (JP)**

• **Kobayashi, Tsuyoshi
NAGANO, Nagano 381-2287 (JP)**
• **Kobayashi, Toshio
NAGANO, Nagano 381-2287 (JP)**
• **Kimura, Yasuyuki
NAGANO, Nagano 381-2287 (JP)**

(74) Representative: **Groth & Co. KB
P.O. Box 6107
102 32 Stockholm (SE)**

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Description

[0001] The present disclosure relates to a package on to which a light emitting element is mounted and a method for manufacturing such a package.

[0002] A conventional package for a light emitting element, such as a light emitting diode (LED), may include a resin housing and lead electrodes, which are connected to the light emitting element (refer to, for example, Japanese Laid-Open Patent Publication Nos. 2002-280616 and 2005-197329). The package will now be described briefly. The housing includes a recess (cavity). Two lead electrodes are exposed in the recess. Each lead electrode has one end facing one end of the other lead electrode. A light emitting element is mounted on one lead electrode and connected to the other lead electrode with a wire. The lead electrodes may be bent in correspondence with the mounting method the package. For example, when the package is surface-mounted onto a substrate, the ends of the lead electrodes on the surface opposite to the recess are bent to face each other. This package can be prepared by arranging a lead frame including the lead electrodes in a metal mold, injecting molten resin into the metal mold, and then curing the resin.

[0003] Recent light emitting elements have increased luminance. Such a light emitting element generates more heat as the amount of the supplied current increases. However, the package including the above lead electrodes has relatively low heat radiation. This makes it difficult to efficiently transfer heat out of the package.

[0004] US 2006/102917 A1 (OYAMA TOSHIHIKO [JP] ET AL; pub. date: 18 May 2006) discloses a package for mounting a light emitting element having an electrically connected reflector to a lead wire and a wiring connector.

[0005] One aspect of the present disclosure is a package for mounting a light emitting element. The package is provided with a housing including an upper surface, a lower surface, and a side surface. A flat plate-shaped electrode includes a lower surface and an upper surface. The lower surface of the electrode is exposed from the lower surface of the housing, and the upper surface of the electrode includes a mounting area on which the light emitting element is mounted. An insulator is arranged on a periphery of the upper surface of the electrode. A frame-shaped element connector is connected to an upper surface of the insulator. A tubular reflective portion extends from a periphery of the element connector to a height corresponding to the upper surface of the housing. A terminal is arranged on the side surface of the housing and connected to the reflective portion. A recess accommodates the light emitting element. The recess is formed in an upper portion of the housing. The recess is formed by the upper surface of the electrode, the element connector, and the reflective portion.

[0006] The present disclosure provides a package having high heat radiation.

[0007] Other aspects and advantages of the present invention will become apparent from the following de-

scription, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

[0008] The present invention discloses a package for mounting a light emitting element and the method for manufacturing thereof according to the claims 1 and 9. Further embodiments are disclosed in the dependent claims.

[0009] The invention, together with objects and advantages thereof, may best be understood by reference to the following description of the presently preferred embodiments together with the accompanying drawings in which:

Fig. 1A is a plan view of a package;

Fig. 1B is a cross-sectional view of the package;

Fig. 2A is an upper perspective view of the package;

Fig. 2B is a lower perspective view of the package;

Fig. 3 is an exploded perspective view of the package;

Fig. 4A is a perspective view of a light emitting device including a package on which a light emitting element has been mounted;

Fig. 4B is a cross-sectional view of the light emitting device of Fig. 4A;

Fig. 5 is a perspective view of a substrate on which packages have been mounted;

Fig. 6 is a perspective view illustrating the mounting of a package onto a substrate;

Figs. 7A, 7B, 7C, and 7D are schematic cross-sectional views illustrating manufacturing steps of the package;

Figs. 8A and 8B are perspective views illustrating manufacturing steps of the package;

Figs. 9A and 9B are schematic cross-sectional views illustrating manufacturing steps of the package;

Figs. 10A, 10B, 10C, and 10D are schematic cross-sectional views illustrating manufacturing steps;

Fig. 11 is a perspective view of a package on which a plurality of elements have been mounted; and

Fig. 12 is a cross-sectional view of another package.

[0010] One embodiment of the present invention will now be described with reference to the drawings. The drawings schematically show structures and are not in actual scale.

[0011] As shown in Figs. 1A and 1B, the package 10 is a substantially tetragonal and planar structure. As shown in Fig. 3, the package 10 includes a housing 20, a first electrode 30, an insulating sheet 40, and a second electrode 50. In the illustrated example, the package 10 further includes a resist film 60. The first electrode 30 is an example of an electrode. The insulating sheet 40 is an example of an insulator.

[0012] The housing 20 is a tetragonal frame. In one example, the housing 20 is prepared by resin-molding the first electrode 30, the insulating sheet 40, and the second electrode 50. The molded product is then cut into

tetragonal pieces. The housing 20 may be formed from an insulating resin, such as polyimide resin, epoxy resin, and silicone resin. The housing 20 may also be formed from a resin material obtained by mixing such a resin with a filler of silica or alumina. The housing 20 may be formed from, for example, a white insulating resin. The white insulating resin may be, for example, a resin material containing epoxy resin or organopolysiloxane resin mixed with a white filler or a white pigment such as TiO_2 or BaSO_4 .

[0013] The first electrode 30 is substantially tetragonal and flat plate-shaped. In the illustrated example, the first electrode 30 includes four corners that are rounded to have a predetermined radius. The first electrode 30 has a thickness of, for example, 0.2 to 0.3 millimeters (mm). As shown in Fig. 4A, a light emitting element 70 is mounted on an upper surface 31 of the first electrode 30. The upper surface 31 of the first electrode 30 includes a mounting area for the light emitting element 70. The light emitting element 70, which may be, for example, a high-luminance light emitting diode (LED), includes electrodes on its upper and lower surfaces. As shown in Fig. 4B, the light emitting element 70 is connected to the upper surface 31 of the first electrode 30 with, for example, solder 72. The first electrode 30 is formed from a conductive material. The first electrode 30 may have a size and thickness selected in accordance with the shape and the characteristics (input current and the like) of the light emitting element 70.

[0014] As shown in Figs. 1B and 2B, the first electrode 30 has a lower surface 32 exposed from the lower surface of the package 10. In a preferred example, the lower surface 32 of the first electrode 30 is substantially flush with a lower surface 21 of the housing 20. It is preferable that the entire lower surface 32 of the first electrode 30 be exposed from the lower surface of the package 10. The light emitting element 70 is supplied with power from the exposed first electrode 30. The exposed first electrode 30 may function as a heat-radiating path or a heat-radiating component that releases the heat generated in the light emitting element 70 out of the package 10. The first electrode 30 is formed from a highly conductive material. The first electrode 30 may be formed from, for example, copper (Cu), a Cu-base alloy, a Fe-Ni alloy, or a Fe-Ni-base alloy. The first electrode 30 may be prepared by, for example, etching or stamping a metal plate. The first electrode 30 may be entirely or partially plated. The plated portions of the first electrode 30 may include the mounting area for the light emitting element 70 and the lower surface 32, which is connected electrically to another conductor. The plating may be, for example, silver plating, a laminate of nickel plating and silver plating sequentially formed on the first electrode 30 or a laminate of nickel plating, palladium plating, and silver plating sequentially formed on the first electrode 30. The lower surface of the first electrode 30 may be referred to as a heat radiation-power supply surface.

[0015] An insulator, such as the insulating sheet 40

having the shape of a tetragonal frame, is arranged on the periphery of the upper surface of the first electrode 30. The insulating sheet 40 connects the periphery of the upper surface of the first electrode 30 to the second electrode 50. The insulating sheet 40 may be formed from, for example, a highly-insulative resin material, such as polyimide.

[0016] The second electrode 50 includes a base 51, which has the shape of a tetragonal frame. The inner edge of the base 51 defines an opening 52, which has four corners rounded to a predetermined radius. The second electrode 50 includes a reflective portion 53, which extends from the inner edge defining the opening 52 toward the first electrode 30. The reflective portion 53, which is substantially tetragonal and tubular, is shaped in conformance with the opening 52. In the illustrated example of Fig. 1B, the reflective portion 53 is tapered to have inner dimensions that decrease from its upper end (the inner edge defining the opening 52) toward its lower end. The inner side surface of the reflective portion 53 may function as an inclined reflective surface that is continuous with the base 51.

[0017] A frame-shaped element connector 54 is connected to the upper surface of the insulating sheet 40. The element connector 54 extends from the lower end of the reflective portion 53. The element connector 54 is a substantially tetragonal frame that is parallel to the base 51. The element connector 54 is parallel to the upper surface 31 of the first electrode 30. The insulating sheet 40 connects the element connector 54 to the periphery of the upper surface of the first electrode 30. The reflective portion 53, the element connector 54, and the first electrode 30, which is connected to the element connector 54, define a recess 11 in the upper surface of the package 10. As shown in Fig. 4A, the recess 11 forms a cavity, in which the light emitting element 70 is mounted.

[0018] A wire 71 electrically connects the element connector 54 to the light emitting element 70. In the illustrated example of Fig. 4A, the wire 71 includes one end connected to the upper surface of the element connector 54 and another end connected to the electrode arranged on the upper surface of the light emitting element 70.

[0019] The second electrode 50 includes a terminal 55. As shown in Figs. 1A and 2A, the terminal 55 is located at a substantially middle position in one side of the package 10.

[0020] The terminal 55 includes a semi-circular side wall 56, and a substantially semi-circular connecting terminal 57, which extends from the lower end of the side wall 56. As shown in Fig. 1B, the side wall 56 extends from the upper surface to the lower surface of the package 10. As shown in Figs. 1B and 2B, a lower surface 58 of the connecting terminal 57 is substantially flush with the lower surface 21 of the housing 20 in the same manner as the first electrode 30. In other words, the lower surface 58 of the connecting terminal 57 is exposed from the lower surface of the package 10. The light emitting element 70 is supplied with power from the exposed con-

necting terminal 57 through the second electrode 50 and the wire 71 (refer to Fig. 4A).

[0021] In the illustrated example, the base 51 of the second electrode 50 includes a plurality of slits 59a to 59e. The second electrode 50 is obtained by, for example, stamping (drawing) a metal plate having a predetermined thickness (0.1 mm, for example). This allows the base 51, the reflective portion 53, the element connector 54, and the terminal 55 to be formed from an integral metal plate.

[0022] The second electrode 50 is formed from a conductive material having high processability. The second electrode 50 may be formed from, for example, Cu, a Cu-base alloy, a Fe-Ni alloy, or a Fe-Ni-base alloy. The second electrode 50 is entirely or partially plated. The plated portions of the second electrode 50 may include the inner side surface of the reflective portion 53, the upper surface of the element connector 54, and the lower surface 58 of the connecting terminal 57. The plating may be, for example, silver plating, a laminate of nickel plating and silver plating sequentially formed on a metal plate or a laminate of nickel plating, palladium plating, and silver plating sequentially formed on a metal plate. The use of silver plating, or the use of the uppermost silver plating layer in the laminated plating layers, effectively increases the reflection of light emitted from the light emitting element 70.

[0023] The slits 59a to 59d prevent or reduce distortion or the like of the reflective portion 53 and the element connector 54 that may occur during processing of the second electrode 50. The slit 59e prevents or reduces distortion or the like of the terminal 55 that may occur during processing of the second electrode 50. In the illustrated example, the slits 59a to 59e are filled with resin that forms the housing 20 (refer to resin portions 22 in Fig. 3). The resin portions 22 fitted in the slits 59a to 59e allow for closer contact between the housing 20 and the second electrode 50.

[0024] The resist film 60 substantially covers the upper surface of the housing 20 and the upper surface of the second electrode 50. The resist film 60 is formed from, for example, a white insulating resin. The white resist film 60 may also function as a reflective film. The white insulating resin may be, for example, a resin material containing epoxy resin or organopolysiloxane resin mixed with a white filler or a white pigment such as TiO_2 or BaSO_4 .

[0025] The operation of the package 10 will now be described.

[0026] As shown in Figs. 4A and 4B, a light emitting device includes the package 10 and the light emitting element 70 mounted on the package 10. The light emitting element 70 is, for example, a high-luminance light emitting diode (LED). The solder 72, for example, electrically connects the light emitting element 70, which is mounted on the upper surface 31 of the first electrode 30, to the first electrode 30. The solder may be formed from, for example, an alloy containing Pb, a Sn-Au alloy,

a Sn-Cu alloy, a Sn-Ag alloy, or a Sn-Ag-Cu alloy. The material for connecting the light emitting element 70 to the first electrode 30 may be a conductive paste, such as a silver paste, or a conductive resin.

[0027] The first electrode 30 is plate-shaped and has an upper surface 31 that is larger than the footprint of the light emitting element 70. The upper surface 31 is partially exposed from the light emitting element 70. This allows the upper surface 31 of the first electrode 30 and the lower surface of the light emitting element 70 to be connected to each other with a low resistance. The entire lower surface of the light emitting element 70 is connected to the upper surface of the first electrode 30. Heat in the light emitting element 70 is transferred from the entire lower surface of the light emitting element 70 to the first electrode 30. The first electrode 30, which is plate-shaped and has a predetermined thickness, efficiently transfers the heat of the light emitting element 70 from its upper surface to its lower surface and thereby release the heat out of the package 10 from the lower surface of the first electrode 30. The first electrode 30 allows for higher radiation of heat generated in the light emitting element 70.

[0028] The wire 71 includes one end connected to the upper surface of the light emitting element 70 and another end connected to the upper surface of the element connector 54 of the second electrode 50. The wire 71 may be, for example, a gold (Au) wire. The element connector 54 has the shape of a frame. This allows the wire 71 to extend in any direction to the light emitting element 70. This structure has no limitation in the connecting direction of the wire 71, and reduces limitations (e.g., directions of the package 10 and the light emitting element 70) imposed on a bonding apparatus that is used to connect the wire 71.

[0029] The light emitting element 70, which is mounted in the recess (cavity) 11 of the package 10, is covered by a transparent resin material 73 filled in the recess 11. A silicone resin may be used as the transparent resin material 73. The resin material 73 may contain, for example, a phosphor. Figs. 4A, 5, 6, and 11 do not show the resin material 73. A further element such as a lens may also be mounted on the package 10.

[0030] As described above, the light emitting device including the light emitting element 70 and the package 10 is mounted on a substrate 80 as shown in Fig. 5. Power supply pads 81 and 82 and a wiring pattern 83, which is connected to the power supply pads 81 and 82, are formed on the substrate 80. As shown in Fig. 6, the substrate 80 includes a substantially tetragonal connecting pad 84, to which the first electrode 30 of the package 10 is connected, and a connecting pad 85, to which the terminal 55 (connecting terminal 57) of the package 10 is connected. The power supply pads 81 and 82 and the wiring pattern 83 supply the package 10 shown in Fig. 5 with drive current.

[0031] The light emitting element 70, which is connected to the substrate 80 as described above, emits light

when supplied with current. The reflective portion 53 reflects some of the light emitted from the light emitting element 70. The surface of the reflective portion 53 is inclined and reflects light upward. The white resist film 60, which is on the upper surface of the package 10, further reflects the light upward from the package 10. This allows for efficient use of the light emitted from the light emitting element 70.

[0032] The procedures for manufacturing the package 10 will now be described.

[0033] As shown in Fig. 7A, a metal plate 100 having a predetermined thickness is first prepared. The metal plate 100 may have a thickness of, for example, 0.1 mm.

[0034] As shown in Fig. 7B, a through-hole 101 is formed in the metal plate 100 by, for example, performing etching or stamping. The size of the through-hole 101 corresponds with the size of an inner opening 54a of the element connector 54 as shown in Fig. 1A. As shown in Fig. 4A, the size of the through-hole 101 is determined in accordance with the dimensions of the light emitting element 70 that is to be mounted. In one example, the slits 59a to 59e shown in Fig. 1A can be formed simultaneously with when the through-hole 101 is formed.

[0035] As shown in Fig. 7C, the entire surface of the metal plate 100, including the inner surface of the through-hole 101, is plated to form a plating layer 102. Subsequently, the metal plate 100 undergoes stamping (drawing) to form the second electrode 50 shown in Fig. 7D. The plating layer 102 may be formed after the stamping (drawing).

[0036] Although Figs. 7A to 7D illustrate the procedures for forming a single second electrode 50, it is preferable that a plurality of second electrodes 50 be simultaneously formed from the metal plate 100. As shown in Fig. 8A, for example, multiple sets of the through-hole 101 and the slits 59a to 59e may be formed in an integral metal plate. Then, as shown in Fig. 8B, stamping (drawing) is performed to form a lead frame 105 including a plurality of connected second electrodes 50, each including the reflective portion 53, the element connector 54, and the terminal 55.

[0037] As shown in Fig. 9A, a metal plate 110 with a predetermined thickness is prepared. The metal plate 110 may have a thickness of, for example, 0.2 mm.

[0038] The entire surface of the metal plate 110 is plated to form a plating layer 111. This completes the first electrode 30 shown in Fig. 9B.

[0039] As shown in Fig. 10A, an insulating sheet 40, to which an adhesive or the like has been applied, is prepared. The insulating sheet 40 connects the second electrode 50 to the upper surface 31 of the first electrode 30. The first electrode 30 is connected to the second electrode 50, which is included in the lead frame 105 shown in Fig. 8A.

[0040] As shown in Fig. 10B, a mold tape 120 is adhered to the upper surface of the lead frame 105 (second electrode 50), which is shown in Fig. 8B. The mold tape 120 covers the opening 52 of the second electrode 50,

or the inner side surface of the reflective portion 53, the element connector 54, and the middle area of the upper surface 31 of the first electrode 30. Although Fig. 10B illustrates the terminal 55 as if it is open in the horizontal direction (rightward in the drawing), adjacent second electrodes 50 are continuously formed in the lead frame 105 as shown in Fig. 8B. The mold tape 120 shown in Fig. 10B covers and closes the truncated conical recess, which is used to form the terminal 55.

[0041] As shown in Fig. 10C, the product shown in Fig. 10B including the first electrode 30 is set in a metal mold 130. Resin 140 is then injected into the metal mold 130. Although Fig. 10C illustrates the metal mold 130 accommodating a single first electrode 30 and a single second electrode 50, it is preferable that the metal mold 130 be able to accommodate the lead frame 105 shown in Fig. 8B and the first electrodes 30, which are connected to the second electrodes 50 of the lead frame 105 by the insulating sheet 40.

[0042] The metal mold 130 is box-shaped. The inner height of the metal mold 130 is substantially the same as the height from the lower surface 32 of the first electrode 30 to the upper surface of the second electrode 50. When the metal mold 130 is closed, the lower surface 32 of the first electrode 30 comes into contact with the inner surface of the metal mold 130. Thus, the lower surface 32 of the first electrode 30 is not covered by the resin 140. The frame-shaped insulating sheet 40 connects the element connector 54 of the second electrode 50 and the upper surface 31 of the first electrode 30. The upper surface of the second electrode 50 is covered by the mold tape 120. This prevents the resin 140 from entering the recess 11 (cavity), which is formed by the second electrode 50 and the first electrode 30, and the recess for the terminal 55.

[0043] The resin 140 injected in the metal mold 130 is cured. Then, the molded product is removed from the metal mold 130, and the mold tape 120 is removed. A resin material is then applied to the upper surface of the second electrode 50 by, for example, performing screen printing. This forms the resist film 60. Subsequently, the lead frame 105 is cut and singulate. This forms the package 10 shown in Fig. 10D.

[0044] The above embodiment has the advantages described below.

(1) The package 10 includes the first electrode 30, which is plate-shaped. The lower surface 32 of the first electrode 30 is substantially flush with the lower surface 21 of the housing 20 and exposed from the lower surface 21 of the housing 20. The light emitting element 70 is connected to the upper surface 31 of the first electrode 30. The heat of the light emitting element 70 is transferred from the entire lower surface of the light emitting element 70 to the first electrode 30. The first electrode 30 is plate-shaped and has a predetermined thickness. The heat of the light emitting element 70 is efficiently transferred from the

upper surface toward the lower surface of the first electrode 30. The package 10 thus allows for high radiation of the heat generated by the light emitting element 70.

(2) The insulating sheet 40 connects the element connector 54 of the second electrode 50 to the periphery of the upper surface of the first electrode 30. The element connector 54 is a tetragonal frame. The wire 71 includes one end connected to the light emitting element 70 and another end connected to the element connector 54. The element connector 54, which is frame-shaped, allows easy changing of the connecting direction of the wire 71. This reduces limitations (e.g., directions of the package 10 and the light emitting element 70) imposed on a bonding apparatus that is used to connect the wire 71.

(3) The reflective portion 53 is formed by bending the metal plate of the second electrode 50 so that the reflective portion 53 is inclined toward the upper end of the package 10. This allows for efficient reflection of light emitted from the light emitting element 70 so that the reflected light travels upward from the package 10. The metal plate is thick enough to have sufficient processability. Accordingly, the reflective portion 53 can be formed easily. The formation of the reflective portion 53 from a metal plate allows for the reflective portion 53 to be plated. The plating allows for efficient reflection of the light emitted from the light emitting element 70.

(4) The frame-shaped insulating sheet 40 connects the element connector 54 of the second electrode 50 to the periphery of the upper surface of the first electrode 30, which is plate-shaped. The element connector 54 is a tetragonal frame. The reflective portion 53, which is substantially tetragonal and tubular, extends upward from the peripheral edge of the element connector 54. The recess 11, which is surrounded by the reflective portion 53, the element connector 54, and the first electrode 30, forms a cavity, in which the light emitting element 70 is mounted. The package 10 eliminates the need for a metal mold having a complicated shape including, for example, a protrusion for forming a cavity). This differs from a package including a cavity formed in a metal mold. More specifically, the package 10 having the recess 11 only uses the metal mold 130, which has the simple shape of a substantially tetragonal box. Thus, the package 10 reduces costs as compared with a package that uses a metal mold to form a cavity.

(5) Since there is no need to use a metal mold to form a cavity, the molded product may easily be removed more easily from the metal mold 130 than when using a metal mold to forming the cavity or the like. This shortens the time during which an apparatus used for resin molding (transfer molding) is stopped and thereby improves productivity. Thus, manufacturing costs may be reduced.

(6) There is no need to use a metal mold to form a

cavity. Thus, the shape of the cavity may be easily changed. Since there is no need to produce a metal mold whenever there is a change in the cavity, manufacturing costs of the package 10 can be reduced.

[0045] It should be apparent to those skilled in the art that the present invention may be embodied in many other specific forms. Particularly, it should be understood that the present invention may be embodied in the following forms.

[0046] The package 10 does not have to be singulated after resin molding. The resin molding may be performed after the singulation process.

[0047] It is only required that the lower surface 58 of the connecting terminal 57 included in the terminal 55 be substantially flush with the lower surface 21 of the housing 20. The side wall 56 of the terminal 55 may be covered by resin.

[0048] A vertical cavity surface emitting laser (VCSEL) may be used as the light emitting element. The light emitting element should not be limited to an element that outputs light in the visible region. The light emitting element may output ultraviolet rays or infrared rays.

[0049] As shown in Fig. 11, for example, the light emitting element 70 and a zener diode 75 may be mounted on the package 10. In the same manner as the light emitting element 70, the zener diode 75 also includes electrodes on its upper and lower surfaces for connection. In the same manner as the light emitting element 70, solder or a conductive paste electrically connects the zener diode 75 to the first electrode 30, and a wire 76 electrically connects the zener diode 75 to the element connector 54. Fig. 11 does not show resin that covers the light emitting element 70 and the zener diode 75.

[0050] Any element other than a zener diode may be mounted on the package 10. For example, a light emitting element, a protective element (e.g., zener diode or capacitor) that protects such a semiconductor element from damages caused by overvoltage, or a combination of such elements may be mounted on the package 10. The element connector 54 for connecting the elements is frame-shaped. This allows the mounted elements to be arranged at any position that does not affect the light emitting element 70 and allows a wire to be connected to the element connector 54.

[0051] The shape of the first electrode 30 may be changed. For example, the first electrode 30 may have a flange 33 as shown in Fig. 12. The flange 33 may be formed by, for example, stamping or etching. The flange 33 allows for closer contact between the first electrode 30 and the resin that forms the housing 20. In another example, the first electrode 30 may have a lower surface 32 having a larger area than the upper surface 31. For example, the first electrode 30 may be in the shape of a frustum.

[0052] The present examples and embodiments are to be considered as illustrative and not restrictive, and the invention is not to be limited to the details given herein,

but may be modified within the scope and equivalence of the appended claims.

Claims

1. A package for mounting a light emitting element, the package comprising:

a housing (20) including an upper surface, a lower surface, and a side surface;

a flat plate-shaped electrode (30) including a lower surface and an upper surface, wherein the lower surface of the electrode (30) is exposed from the lower surface (21) of the housing (20), and the upper surface (31) of the electrode (30) includes a mounting area on which the light emitting element is mounted;

an insulator (40) arranged on a periphery of the upper surface of the electrode (30);

a frame-shaped element connector (54) connected to an upper surface of the insulator (40); a tubular reflective portion (53) that extends from a periphery of the element connector (54) to a height corresponding to the upper surface of the housing (20);

a frame-shaped base (51) arranged on the upper surface of the housing (20) and connected to the reflective portion (53);

a terminal (55) arranged on the side surface of the housing (20) and connected to the reflective portion (53) and the base (51); and

a recess (11) that accommodates the light emitting element, wherein the recess (11) is formed in an upper portion of the housing (20), and the recess (11) is formed by the upper surface of the electrode (30), the element connector (54), and the reflective portion (53), the package **characterized in that** the terminal (55) includes an arc-shaped side wall (56) that includes an upper end connected to the base (51) and a lower end extending to the lower surface of the housing (20), and the side wall (56) has a diameter that increases toward the upper end, and a connecting terminal (57) that is connected to the lower end of the side wall (56) and exposed from the lower surface (21) of the housing (20), wherein a lower surface (58) of the connecting terminal (57) is flush with the lower surface (21) of the housing (20).

2. The package according to claim 1, wherein the upper surface of the electrode (30) and the element connector (54) each include a portion connected to an electrode of the light emitting element.
3. The package according to claim 1, wherein the element connector (54), the terminal (55), the reflective

portion (53), and the base (51) are formed from an integral metal plate.

4. The package according to claim 3, wherein the electrode (30) is a metal plate that is thicker than each of the element connector (54) and the reflective portion (53).
5. The package according to claim 1, wherein the reflective portion (53) is tubular and includes an opening with a diameter that increases from the element connector (54) toward the upper surface of the housing (20).
6. The package according to claim 1, wherein the housing (20) is a plate-shaped and is formed from an insulating resin.
7. The package according to claim 1, wherein the lower surface of the electrode (30) is exposed from the lower surface of the housing (20) and forms a heat radiation-power supply surface.
8. The package according to claim 1, wherein the lower surface of the electrode (30) is entirely flush with the lower surface of the housing (20).
9. A method for manufacturing a package for mounting a light emitting element, the method comprising:
 - forming a flat plate-shaped electrode (30) from a first metal plate (110);
 - forming an opening (52) in a second metal plate (100) and bending the second metal plate (100) to form a frame-shaped element connector (54) surrounding the opening (52) and to form a tubular reflective portion (53) that is connected to the element connector (54) forming a frame-shaped base (51) arranged on an upper surface of a housing (20) and connected to the reflective portion (53), and to form a terminal (55) arranged on a side surface of the housing (20) and connected to the reflective portion (53) and the base (51)
 - wherein the terminal (55) includes an arc-shaped side wall (56) that includes an upper end connected to the base (51) and a lower end extending to a lower surface (21) of the housing (20), and the side wall (56) has a diameter that increases toward the upper end, and a connecting terminal (57) that is connected to the lower end of the side wall (56) and exposed from the lower surface (21) of the housing (20);
 - connecting the element connector (54) to a periphery of an upper surface of the electrode (30) with an annular insulating sheet (40); and
 - setting the second metal plate (100) and the electrode (30) in a metal mold so that the metal

mold closes a recess (11) that is surrounded by the electrode (30), the element connector (54), and the reflective portion (53), and injecting resin (140) into the metal mold to form the housing (20), wherein a lower surface (58) of the connecting terminal (57) is flush with the lower surface (21) of the housing (20).

10. The method according to claim 9, further comprising covering an upper surface of the second metal plate (100) with a mold tape (120), wherein the metal mold includes a mold cavity into which the second metal plate (100) covered by the mold tape (120) and the electrode (30) are set, and the mold cavity has a height equal to a height from a lower surface of the electrode (30) to an upper surface of the mold tape (120).
11. The method according to claim 10, wherein the resin injected into the metal mold forms the housing (20), and the housing (20) is connected to the second metal plate (100) and to a peripheral side surface of the electrode (30) and formed from an insulating resin.
12. The method according to claim 11, wherein the bending the second metal plate (100) includes forming a terminal (55) connected to the reflective portion (53) on the second metal plate (100), and injecting the resin includes injecting the resin into the metal mold so that the terminal (55) is located on the side surface of the housing (20).
13. A light emitting device comprising:
 - the package (10) according to claim 1;
 - a light emitting element (70) accommodated in the recess (11) of the package (10); and
 - a light transmissive resin material (73) filled in the recess (11) to cover the light emitting element (70),
 - wherein the lower surface of the electrode (30) is exposed from the light emitting device and defines a heat radiation-power supply surface.

Patentansprüche

1. Verpackung zum Anbringen eines lichtemittierenden Elements, die Verpackung aufweisend:

ein Gehäuse (20) mit einer oberen Oberfläche, einer unteren Oberfläche und einer Seitenfläche;
eine flache plattenförmige Elektrode (30) mit einer unteren Oberfläche und einer oberen Oberfläche, wobei die untere Oberfläche der Elektrode (30) von der unteren Oberfläche (21) des Gehäuses (20) freiliegt und die obere Oberfläche

(31) der Elektrode (30) einen Anbringungsbe-
reich enthält, auf dem das lichtemittierende Element angebracht ist;
einen Isolator (40), der an einem Umfang der oberen Oberfläche der Elektrode (30) angeordnet ist;
einen rahmenförmigen Elementverbinder (54), der mit einer oberen Oberfläche des Isolators (40) verbunden ist;
einen röhrenförmigen reflektierenden Abschnitt (53), der von einem Umfang des Elementverbinders (54) auf eine Höhe verläuft, die der oberen Oberfläche des Gehäuses (20) verläuft;
eine rahmenförmige Basis (51), die an der oberen Oberfläche des Gehäuses (20) angeordnet und mit dem reflektierenden Abschnitt (53) verbunden ist;
einen Anschluss (55), der an der Seitenfläche des Gehäuses (20) angeordnet und mit dem reflektierenden Abschnitt (53) und der Basis (51) verbunden ist; und
eine Aussparung (11), die das lichtemittierende Element aufnimmt, wobei die Aussparung (11) in einem oberen Abschnitt des Gehäuses (20) ausgebildet ist und die Aussparung (11) durch die obere Oberfläche der Elektrode (30), den Elementverbinder (54) und den reflektierenden Abschnitt (53) ausgebildet ist, wobei die Verpackung **dadurch gekennzeichnet ist, dass** der Anschluss (55) enthält:

eine bogenförmige Seitenwand (56), die ein oberes Ende, das mit der Basis (51) verbunden ist, und ein unteres Ende enthält, das zur unteren Oberfläche des Gehäuses (20) verläuft, und wobei die Seitenwand (56) einen Durchmesser aufweist, der zum oberen Ende hin zunimmt, und einen Verbindungsanschluss (57), der mit dem unteren Ende der Seitenwand (56) verbunden ist und von der unteren Oberfläche (21) des Gehäuses (20) freiliegt, wobei eine untere Oberfläche (58) des Verbindungsanschlusses (57) mit der unteren Oberfläche (21) des Gehäuses (20) bündig ist.

2. Verpackung nach Anspruch 1, wobei die obere Oberfläche der Elektrode (30) und der Elementverbinder (54) jedes einen Abschnitt enthält, der mit einer Elektrode des lichtemittierenden Elements verbunden ist.
3. Verpackung nach Anspruch 1, wobei der Elementverbinder (54), der Anschluss (55), der reflektierende Abschnitt (53) und die Basis (51) aus einer einstückigen Metallplatte ausgebildet sind.
4. Verpackung nach Anspruch 3, wobei die Elektrode

(30) eine Metallplatte ist, die dicker als jeder des Elementverbinders (54) und des reflektierenden Abschnitts (53) ist.

5. Verpackung nach Anspruch 1, wobei der reflektierende Abschnitt (53) röhrenförmig ist und eine Öffnung mit einem Durchmesser enthält, der vom Elementverbinder (54) zur oberen Oberfläche des Gehäuses (20) hin zunimmt. 5
6. Verpackung nach Anspruch 1, wobei das Gehäuse (20) plattenförmig ist und aus einem Isolierharz ausgebildet ist. 10
7. Verpackung nach Anspruch 1, wobei die untere Oberfläche der Elektrode (30) von der unteren Oberfläche des Gehäuses (20) freiliegt und eine Wärmeabstrahlungs-/Stromversorgungsfläche ausbildet. 15
8. Verpackung nach Anspruch 1, wobei die untere Oberfläche der Elektrode (30) mit der unteren Oberfläche des Gehäuses (20) völlig bündig ist. 20
9. Verfahren zur Herstellung einer Verpackung zum Anbringen eines lichtemittierenden Elements, das Verfahren aufweisend: 25

Ausbilden einer flachen plattenförmigen Elektrode (30) aus einer ersten Metallplatte (110);
 Ausbilden einer Öffnung (52) in einer zweiten Metallplatte (100) und Biegen der zweiten Metallplatte (100) zum Ausbilden eines rahmenförmigen Elementverbinders (54), der die Öffnung (52) umgibt, und zum Ausbilden eines röhrenförmigen reflektierenden Abschnitts (53), der mit dem Elementverbinder (54) verbunden ist; Ausbilden einer rahmenförmigen Basis (51), die auf einer oberen Oberfläche eines Gehäuses (20) angeordnet und mit dem reflektierenden Abschnitt (53) verbunden ist; und zum Ausbilden eines Anschlusses (55), der an einer Seitenfläche des Gehäuses (20) angeordnet und mit dem reflektierenden Abschnitt (53) und der Basis (51) verbunden ist; wobei der Anschluss (55) enthält: 30

eine bogenförmige Seitenwand (56), die ein oberes Ende, das mit der Basis (51) verbunden ist, und ein unteres Ende enthält, das zu einer unteren Oberfläche (21) des Gehäuses (20) verläuft, und wobei die Seitenwand (56) einen Durchmesser aufweist, der zum oberen Ende hin zunimmt, und einen Verbindungsanschluss (57), der mit dem unteren Ende der Seitenwand (56) verbunden ist und von der unteren Oberfläche (21) des Gehäuses (20) freiliegt; Verbinden des Elementverbinders (54) mit 45

einem Umfang einer oberen Oberfläche der Elektrode (30) mit einer ringförmigen Isolierbahn (40); und

derartiges Einrichten der zweiten Metallplatte (100) und der Elektrode (30) in einer Metallform, dass die Metallform eine Aussparung (11) schließt, die durch die Elektrode (30), den Elementverbinder (54) und den reflektierenden Abschnitt (53) umgeben ist, und Einspritzen von Harz (140) in die Metallform zum Ausbilden des Gehäuses (20), wobei eine untere Oberfläche (58) des Verbindungsanschlusses (57) mit der unteren Oberfläche (21) des Gehäuses (20) bündig ist.

10. Verfahren nach Anspruch 9, ferner aufweisend das Abdecken einer oberen Oberfläche der zweiten Metallplatte (100) mit einem Formband (120), wobei die Metallform einen Formhohlraum enthält, in dem die zweite Metallplatte (100), die durch das Formband (120) abgedeckt ist, und die Elektrode (30) eingerichtet werden, und der Formhohlraum eine Höhe aufweist, die gleich einer Höhe von einer unteren Oberfläche der Elektrode (30) zu einer oberen Oberfläche des Formbands (120) ist.

11. Verfahren nach Anspruch 10, wobei das Harz, das in die Metallform eingespritzt wird, das Gehäuse (20) ausbildet und das Gehäuse (20) mit der zweiten Metallplatte (100) und mit einer peripheren Seitenfläche der Elektrode (30) verbunden und aus einem Isolierharz ausgebildet wird. 35

12. Verfahren nach Anspruch 11, wobei das Biegen der zweiten Metallplatte (100) das Ausbilden eines Anschlusses (55) beinhaltet, der mit dem reflektierenden Abschnitt (53) an der zweiten Metallplatte (100) verbunden wird, und das Einspritzen des Harzes das derartige Einspritzen des Harzes in die Metallform beinhaltet, dass sich der Anschluss (55) an der Seitenfläche des Gehäuses (20) befindet. 40

13. Lichtemittierendes Gerät, aufweisend: 45

die Verpackung (10) nach Anspruch 1;
 ein lichtemittierendes Element (70), das in der Aussparung (11) der Verpackung (10) aufgenommen ist; und
 ein lichtdurchlässiges Harzmaterial (73), das zum Abdecken des lichtemittierenden Elements (70) in die Aussparung (11) gefüllt ist, wobei die untere Oberfläche der Elektrode (30) vom lichtemittierenden Gerät freiliegt und eine Wärmeabstrahlungs-/Stromversorgungsfläche definiert. 55

Revendications

1. Boîtier pour monter un élément électroluminescent, le boîtier comprenant :

une coque (20) comprenant une surface supérieure, une surface inférieure et une surface latérale ;

une électrode en forme de plaque plate (30) comprenant une surface inférieure et une surface supérieure, dans lequel la surface inférieure de l'électrode (30) est exposée depuis la surface inférieure (21) de la coque (20) et la surface supérieure (31) de l'électrode (30) comprend une zone de montage sur laquelle l'élément électroluminescent est monté ;

un isolant (40) disposé sur une périphérie de la surface supérieure de l'électrode (30) ;

un connecteur d'élément en forme de cadre (54) raccordé à une surface supérieure de l'isolant (40) ;

une partie réfléchissante tubulaire (53) qui s'étend depuis une périphérie du connecteur d'élément (54) jusqu'à une hauteur correspondant à la surface supérieure de la coque (20) ;

une base en forme de cadre (51) disposée sur la surface supérieure de la coque (20) et raccordée à la partie réfléchissante (53) ; une borne (55) disposée sur la surface latérale de la coque (20) et raccordée à la partie réfléchissante (53) et à la base (51) ; et

un évidement (11) qui reçoit l'élément électroluminescent, dans lequel l'évidement (11) est formé dans une partie supérieure de la coque (20) et l'évidement (11) est formé par la surface supérieure de l'électrode (30), le connecteur d'élément (54) et la partie réfléchissante (53), le boîtier étant **caractérisé en ce que** la borne (55) comprend

une paroi latérale en forme d'arc (56) qui comprend une extrémité supérieure raccordée à la base (51) et une extrémité inférieure s'étendant jusqu'à la surface inférieure de la coque (20), et la paroi latérale (56) présente un diamètre qui augmente vers l'extrémité supérieure, et

une borne de raccordement (57) qui est raccordée à l'extrémité inférieure de la paroi latérale (56) et exposée depuis la surface inférieure (21) de la coque (20), dans lequel une surface inférieure (58) de la borne de raccordement (57) est à niveau avec la surface inférieure (21) de la coque (20).

2. Boîtier selon la revendication 1, dans lequel la surface supérieure de l'électrode (30) et le connecteur d'élément (54) comprennent chacun une partie raccordée à une électrode de l'élément électroluminescent.

3. Boîtier selon la revendication 1, dans lequel le connecteur d'élément (54), la borne (55), la partie réfléchissante (53) et la base (51) sont formés à partir d'une plaque métallique d'un seul tenant.

4. Boîtier selon la revendication 3, dans lequel l'électrode (30) est une plaque métallique qui est plus épaisse que l'élément de connecteur (54) et la partie réfléchissante (53).

5. Boîtier selon la revendication 1, dans lequel la partie réfléchissante (53) est tubulaire et comprend une ouverture ayant un diamètre qui augmente depuis le connecteur d'élément (54) vers la surface supérieure de la coque (20).

6. Boîtier selon la revendication 1, dans lequel la coque (20) se présente sous la forme d'une plaque et est formée à partir d'une résine isolante.

7. Boîtier selon la revendication 1, dans lequel la surface inférieure de l'électrode (30) est exposée depuis la surface inférieure de la coque (20) et forme une surface d'alimentation en énergie de rayonnement thermique.

8. Boîtier selon la revendication 1, dans lequel la surface inférieure de l'électrode (30) est entièrement à niveau avec la surface inférieure de la coque (20).

9. Procédé pour fabriquer un boîtier pour monter un élément électroluminescent, le procédé consistant :

à former une électrode en forme de plaque plate (30) à partir d'une première plaque métallique (110) ;

à former une ouverture (52) dans une seconde plaque métallique (100) et à plier la seconde plaque métallique (100) pour former un connecteur d'élément en forme de cadre (54) entourant l'ouverture (52) et pour former une partie réfléchissante tubulaire (53) qui est raccordée au connecteur d'élément (54) ; à former une base en forme de cadre (51) disposée sur une surface supérieure d'une coque (20) et raccordée à la partie réfléchissante (53) ; et pour former une borne (55) disposée sur une surface latérale de la coque (20) et raccordée à la partie réfléchissante (53) et à la base (51) ; dans lequel la borne (55) comprend une paroi latérale en forme d'arc (56) qui comprend une extrémité supérieure raccordée à la base (51) et une extrémité inférieure s'étendant jusqu'à une surface inférieure (21) de la coque (20), et la paroi latérale (56) présente un diamètre qui augmente vers l'extrémité supérieure, et une borne de raccordement (57) qui est raccordée à l'extrémité inférieure de la paroi latérale (56) et exposée depuis la surface inférieure

- rieure (21) de la coque (20) ;
à raccorder le connecteur d'élément (54) à une
périphérie d'une surface supérieure de l'électro-
de (30) avec une feuille isolante annulaire (40) ;
et 5
à mettre la seconde feuille métallique (100) et
l'électrode (30) dans un moule métallique de tel-
le sorte que le moule métallique ferme un évi-
dement (11) qui est entouré par l'électrode (30),
le connecteur d'élément (54) et la partie réflé- 10
chissante (53) et à injecter une résine (140) dans
le moule métallique pour former la coque (20),
dans lequel une surface inférieure (58) de la bor-
ne de raccordement (57) est à niveau avec la
surface inférieure (21) de la coque (20). 15
- 10.** Procédé selon la revendication 9, consistant en outre
à recouvrir une surface supérieure de la seconde
plaque métallique (100) avec une bande de moule 20
(120), dans lequel
le moule métallique comprend une cavité de moule
dans laquelle la seconde plaque métallique (100)
recouverte par la bande de moule (120) et l'électrode
(30) sont mises, et
la cavité de moule présente une hauteur égale à une 25
hauteur allant d'une surface inférieure de l'électrode
(30) à une surface supérieure de la bande de moule
(120).
- 11.** Procédé selon la revendication 10, dans lequel la 30
résine injectée dans le moule métallique forme la
coque (20) et la coque (20) est raccordée à la second
plaque métallique (100) et à une surface latérale pé-
riphérique de l'électrode (30) et formée à partir d'une
résine isolante. 35
- 12.** Procédé selon la revendication 11, dans lequel
le pliage de la seconde plaque métallique (100) con-
siste à former une borne (55) raccordée à la partie
réfléchissante (53) sur la seconde plaque métallique 40
(100), et
l'injection de la résine consiste à injecter la résine
dans le moule métallique de telle sorte que la borne
(55) soit située sur la surface latérale de la coque
(20). 45
- 13.** Dispositif électroluminescent comprenant :
- le boîtier (10) selon la revendication 1 ;
un élément électroluminescent (70) reçu dans 50
l'évidement (11) du boîtier (10) ; et
un matériau de résine de transmission de lumière
(73) rempli dans l'évidement (11) pour recou-
vrir l'élément électroluminescent (70),
dans lequel la surface inférieure de l'électrode 55
(30) est exposée depuis le dispositif électrolu-
minescent et définit une surface d'alimentation
en énergie de rayonnement thermique.

Fig.1 A

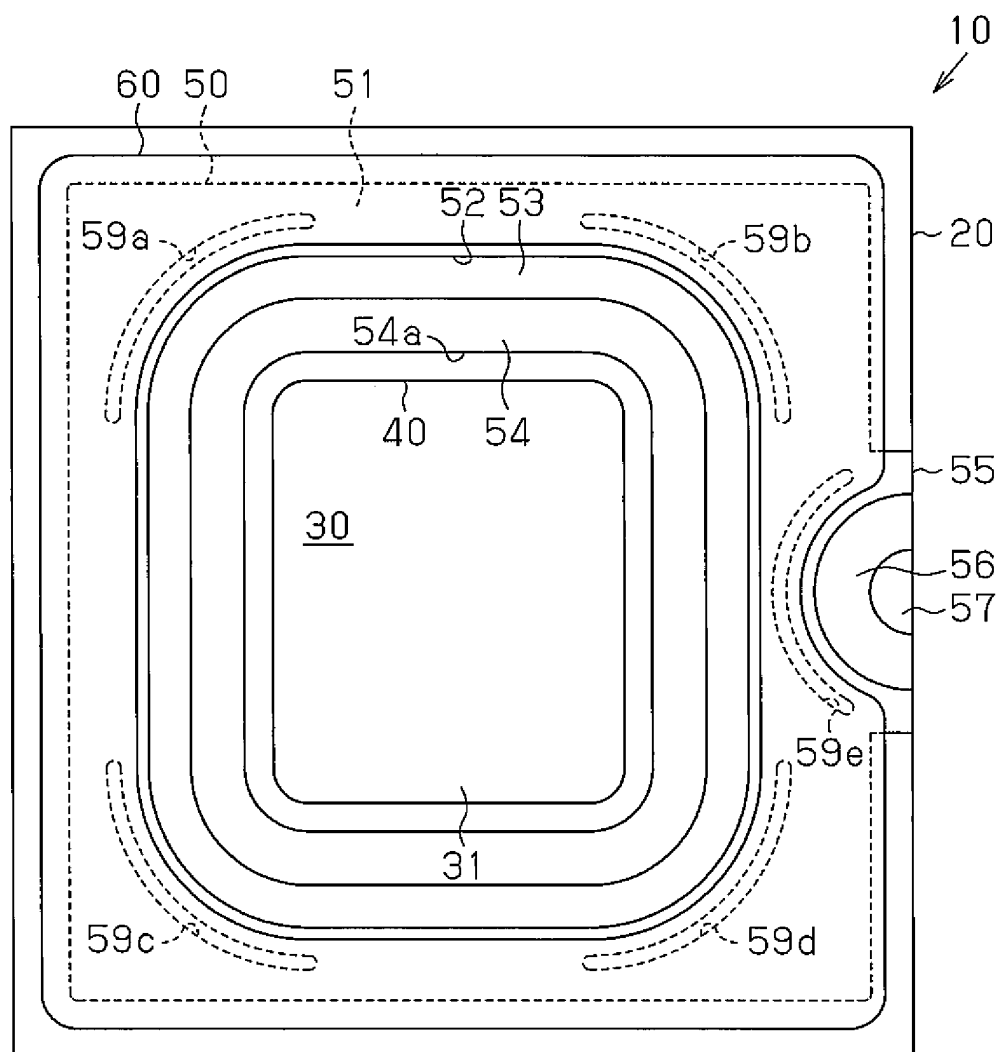


Fig.1 B

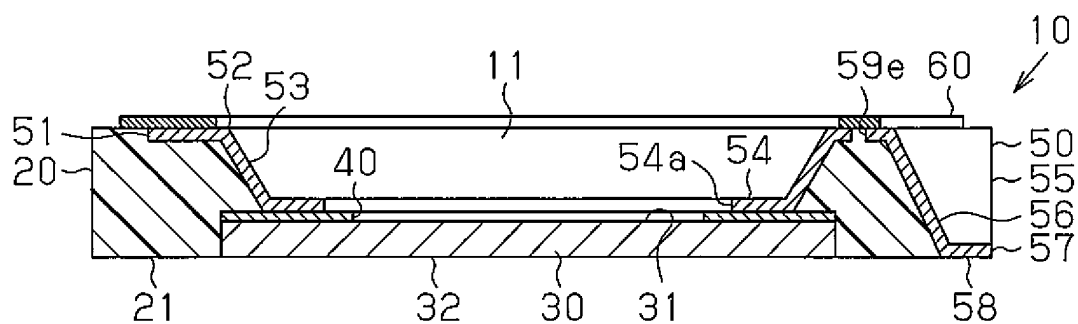


Fig.2A

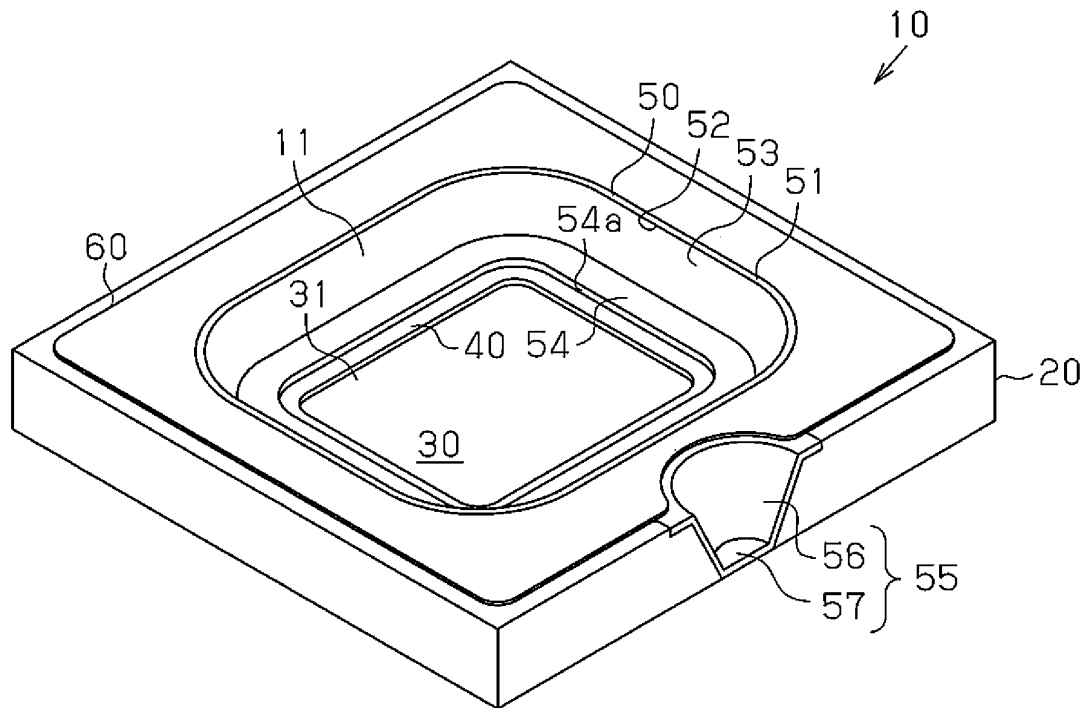


Fig.2B

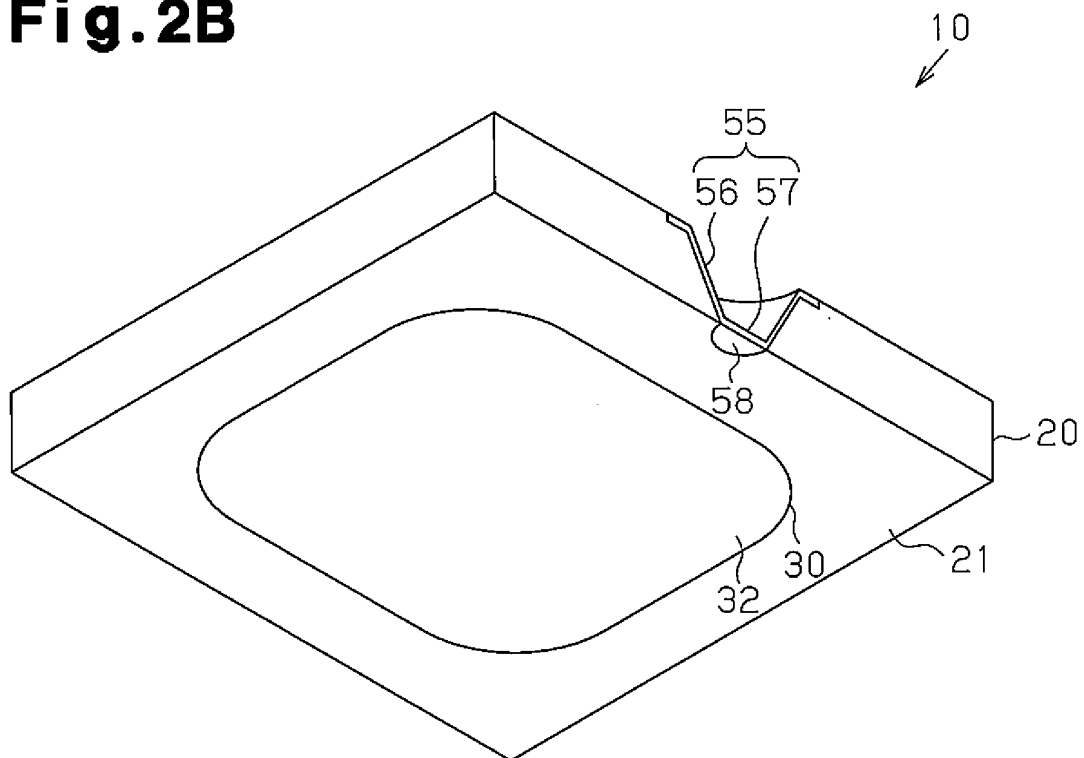


Fig.3

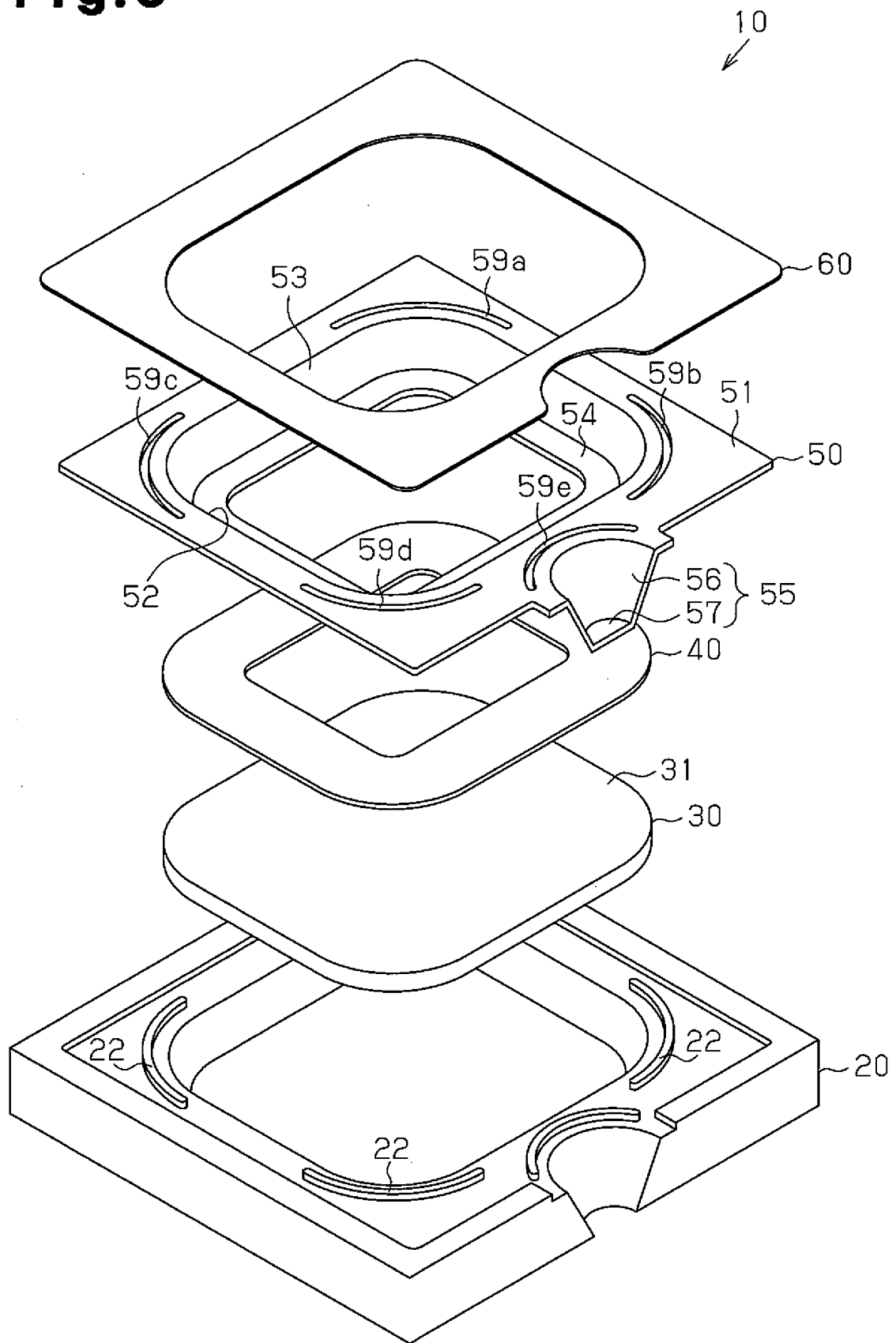


Fig.4A

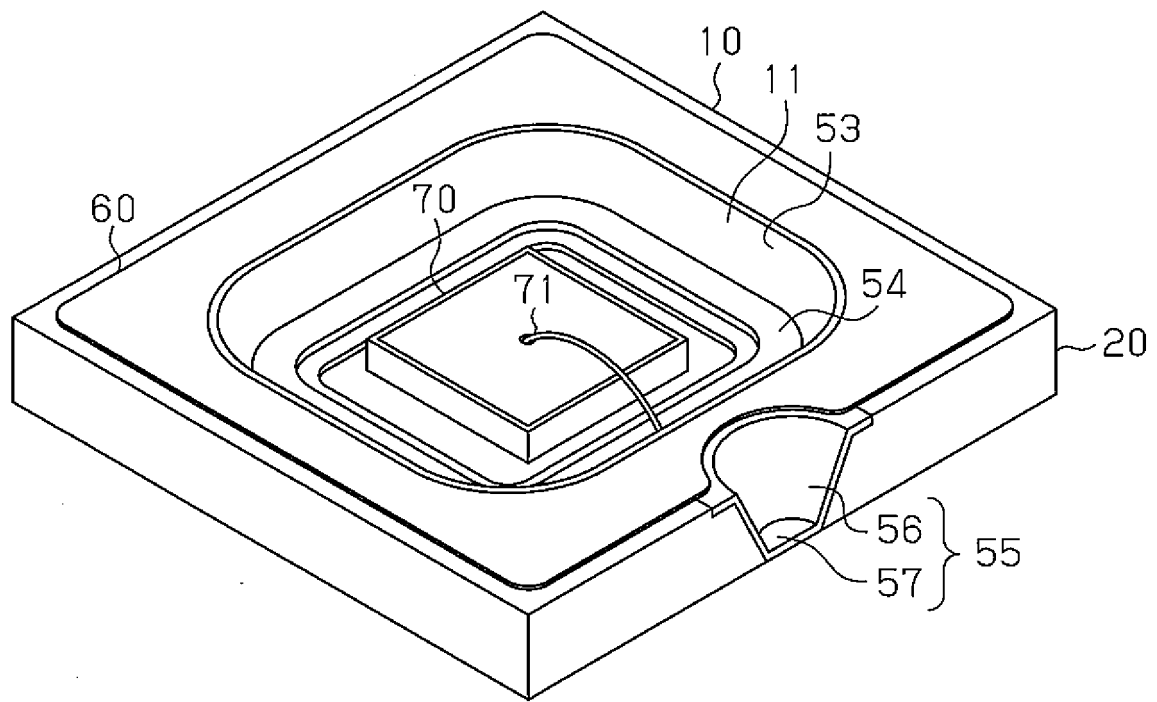


Fig.4B

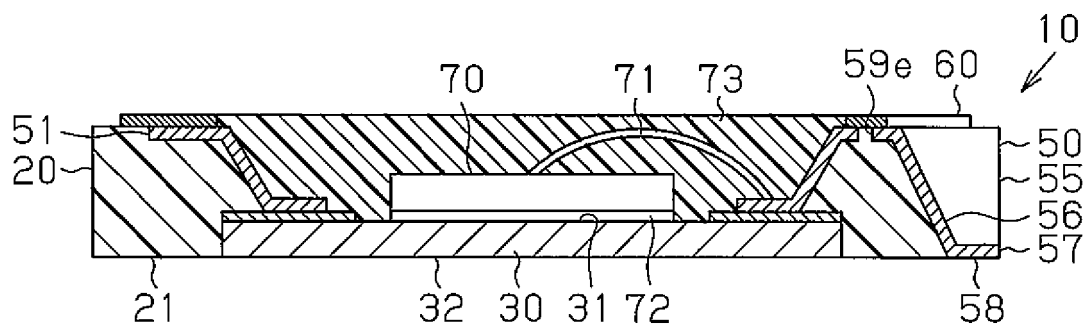


Fig. 5

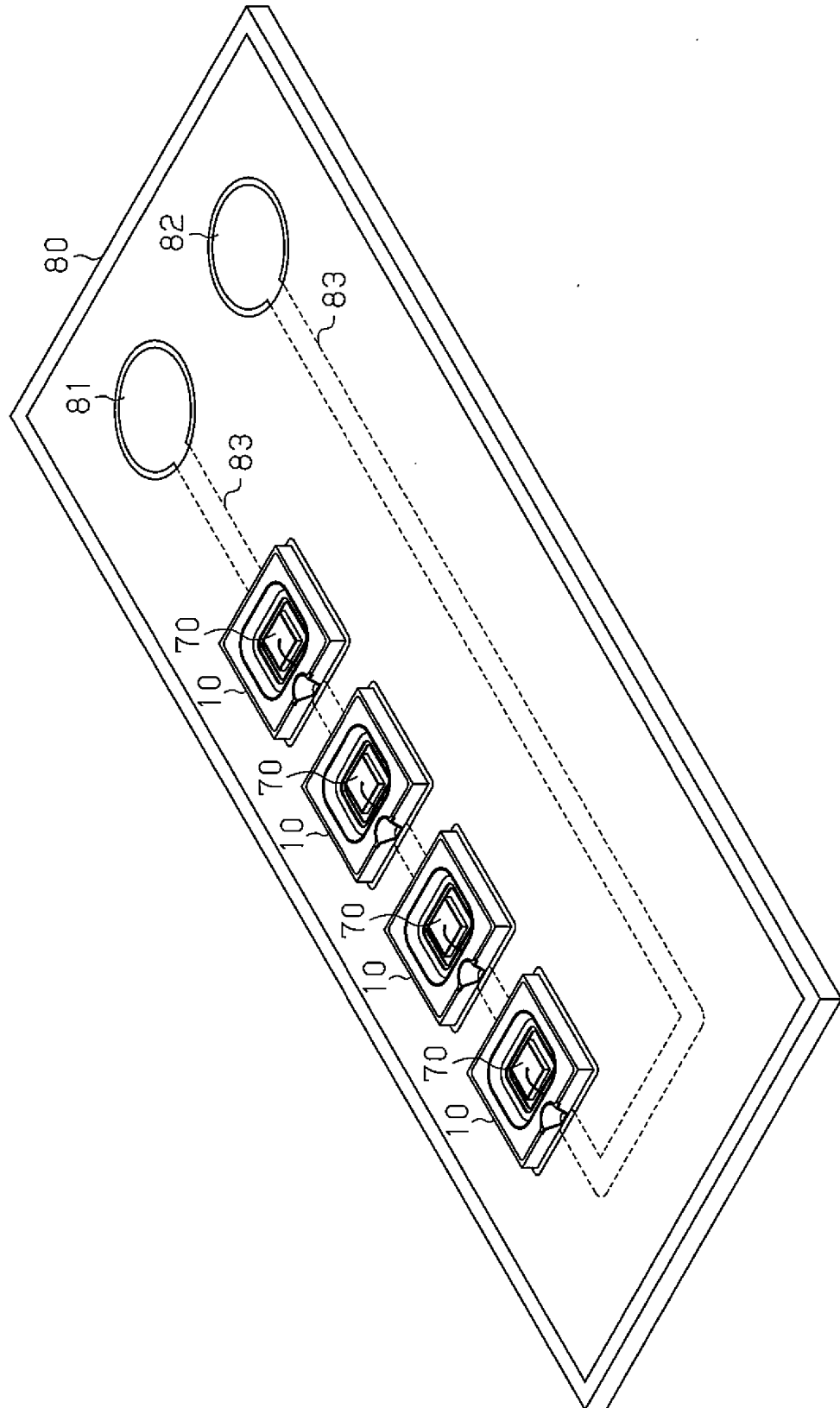


Fig. 6

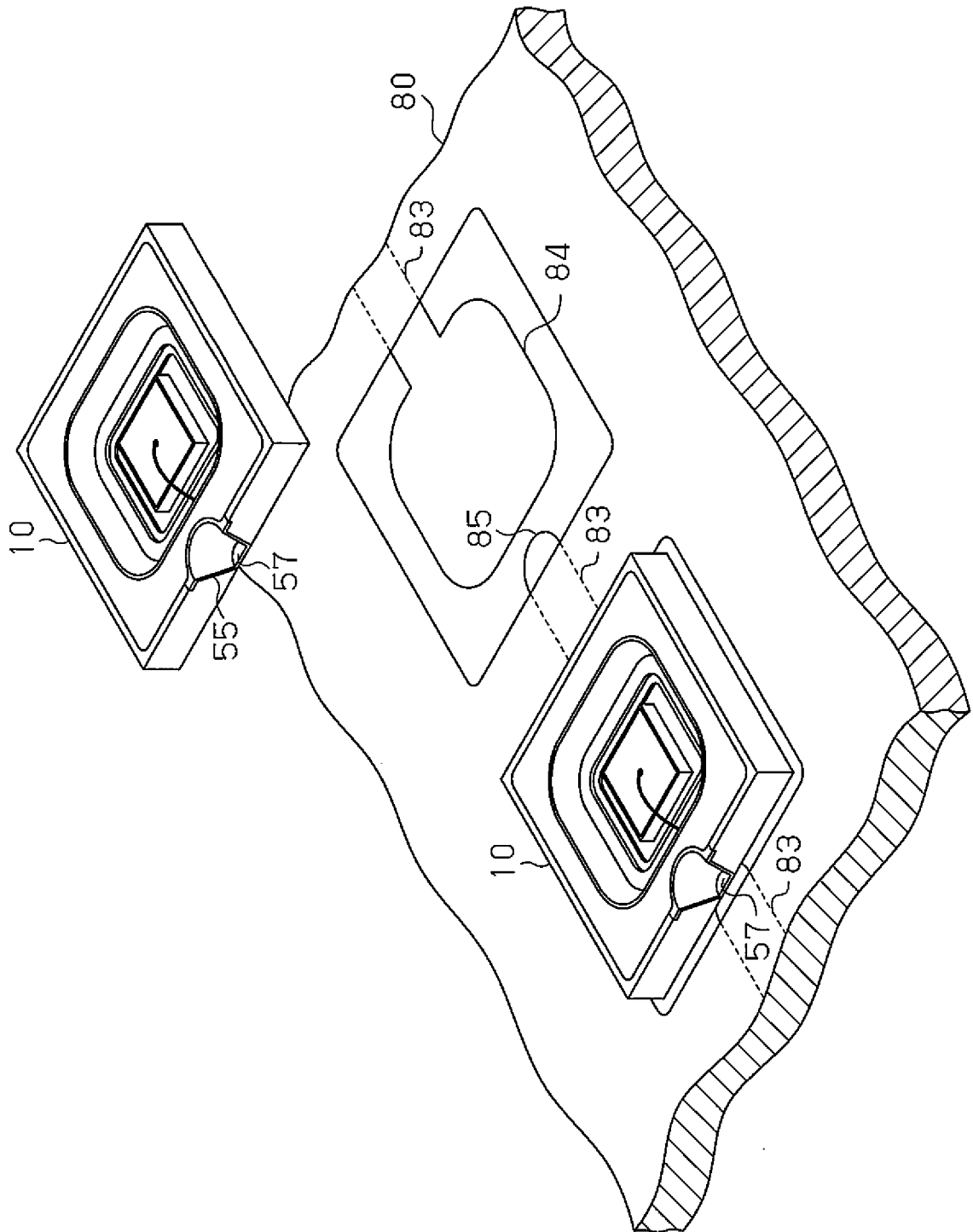


Fig.7A

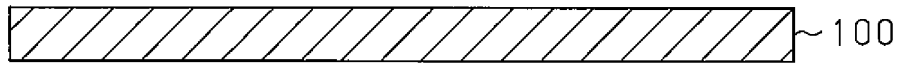


Fig.7B

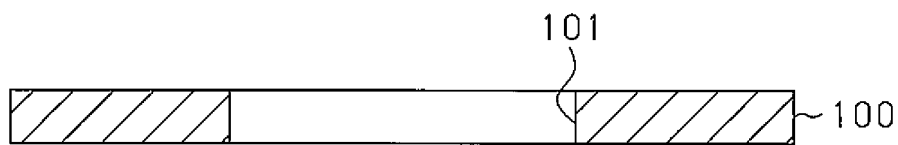


Fig.7C

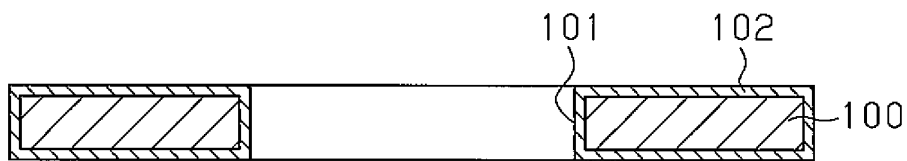


Fig.7D

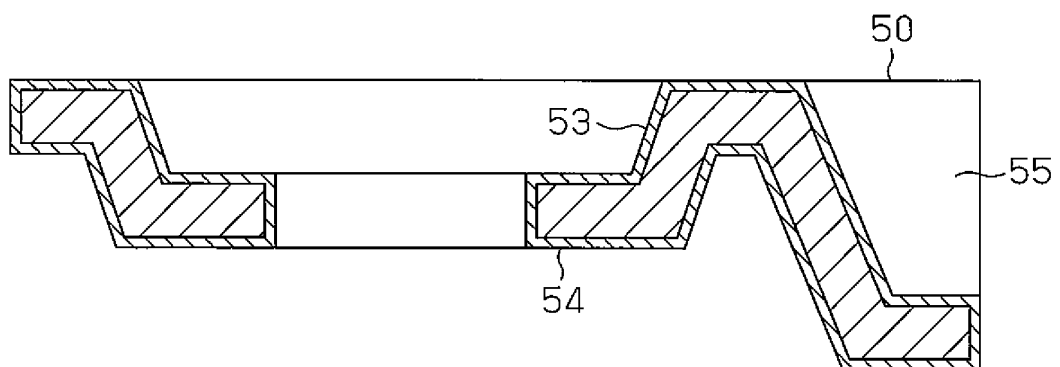


Fig.8A

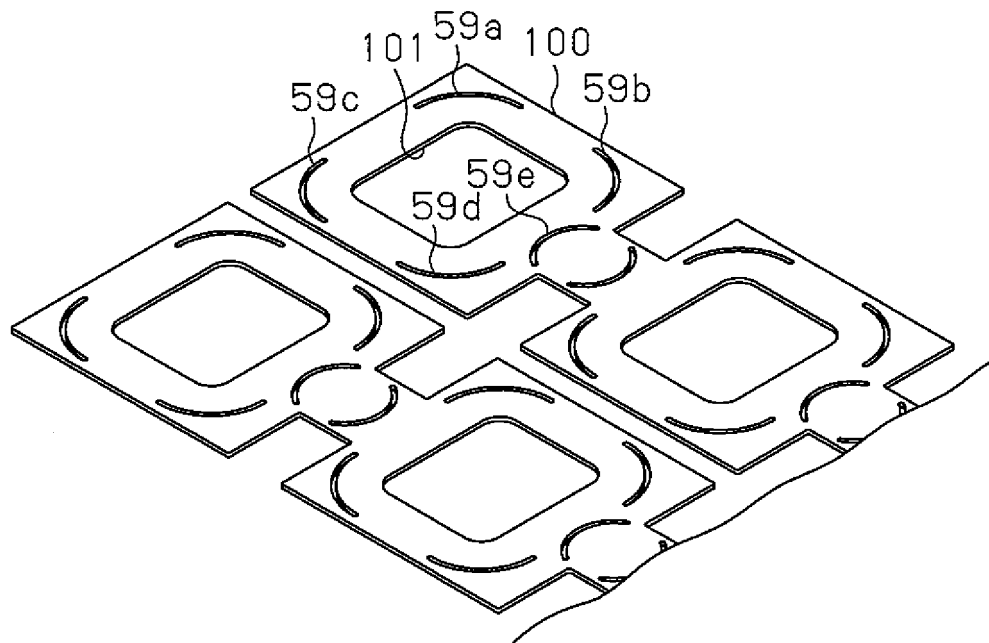


Fig.8B

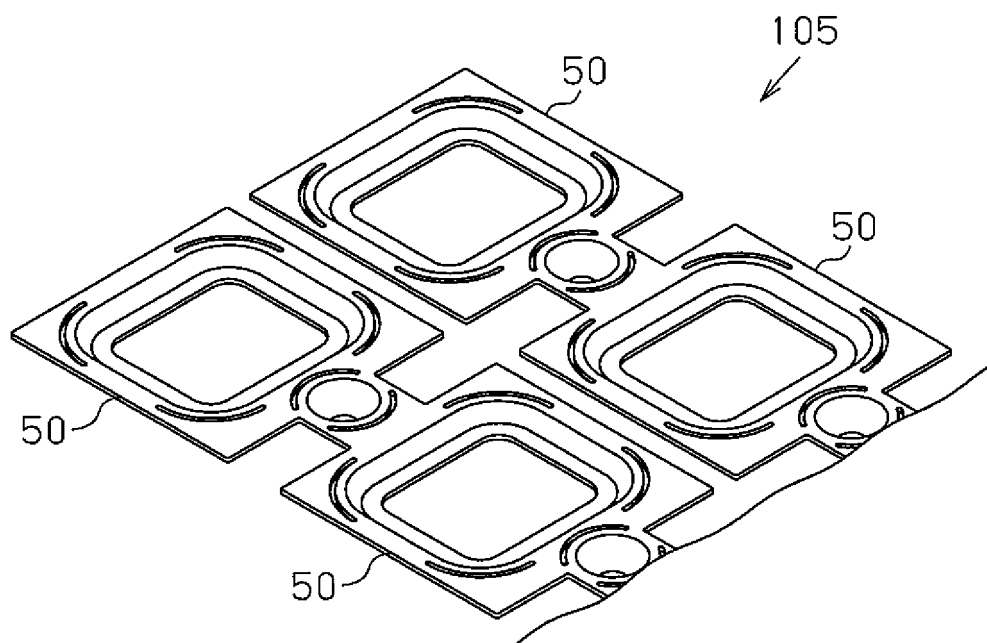


Fig.9A



Fig.9B

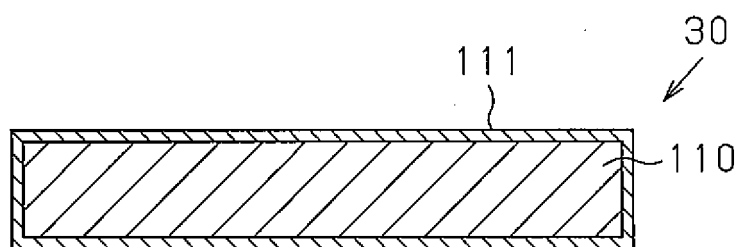


Fig.10A

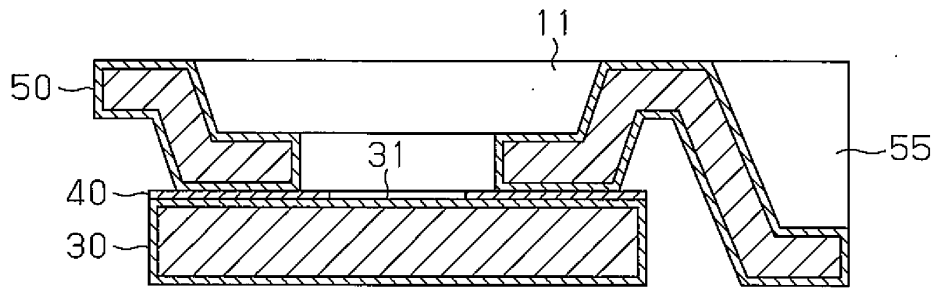


Fig.10B

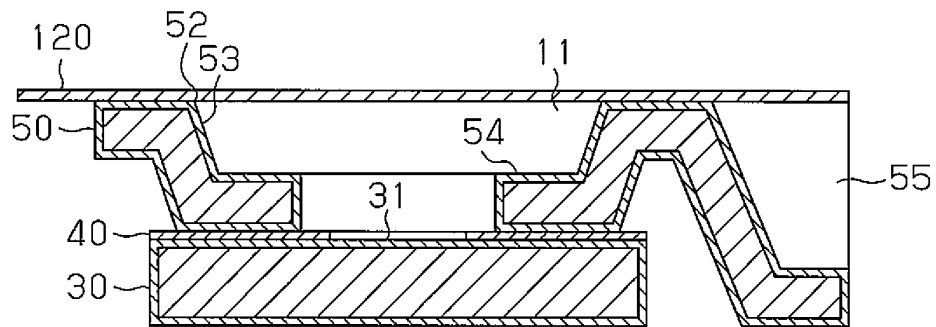


Fig.10C

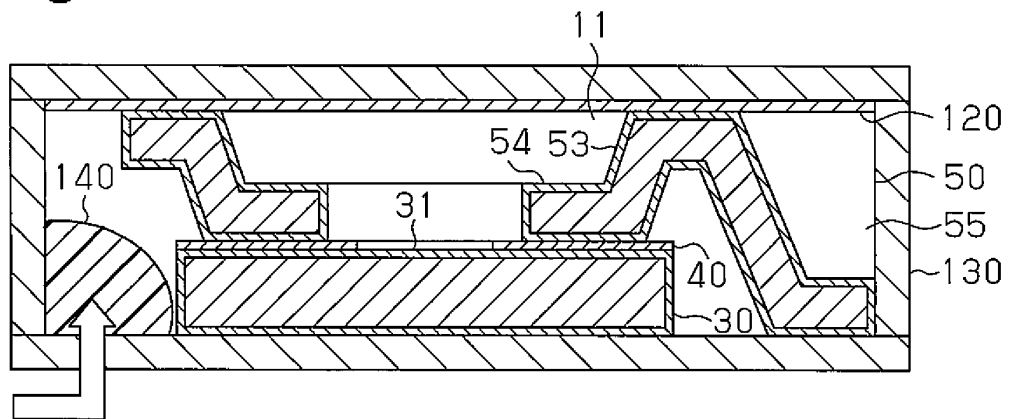


Fig.10D

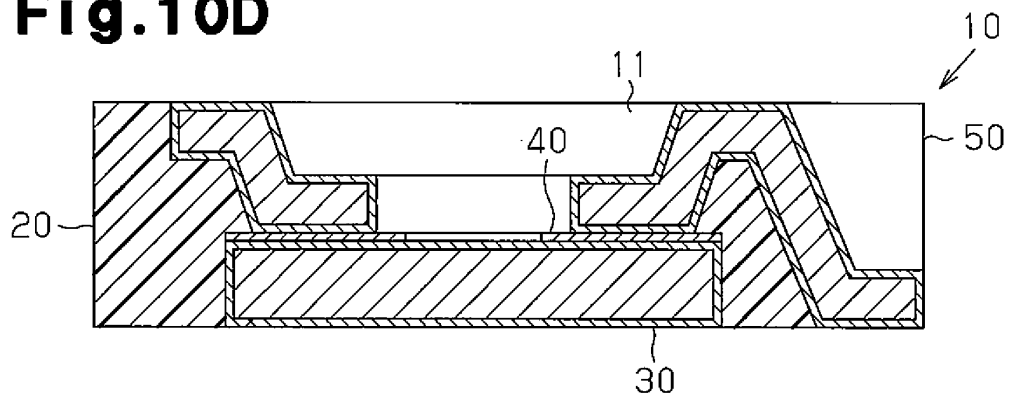


Fig.11

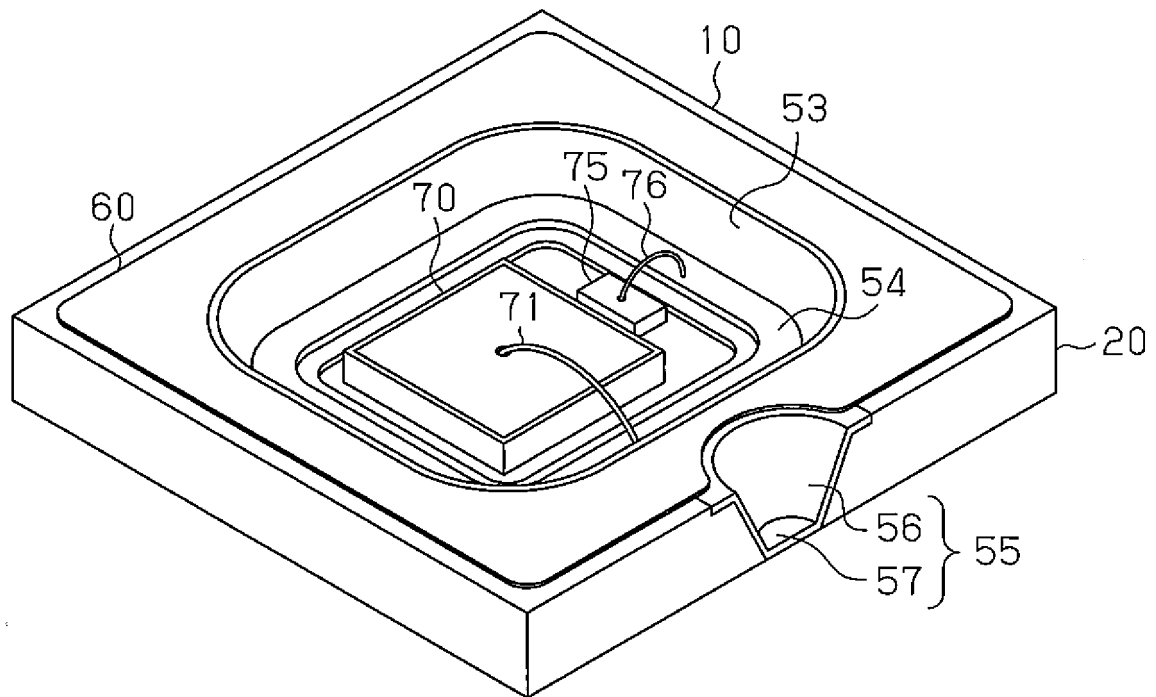
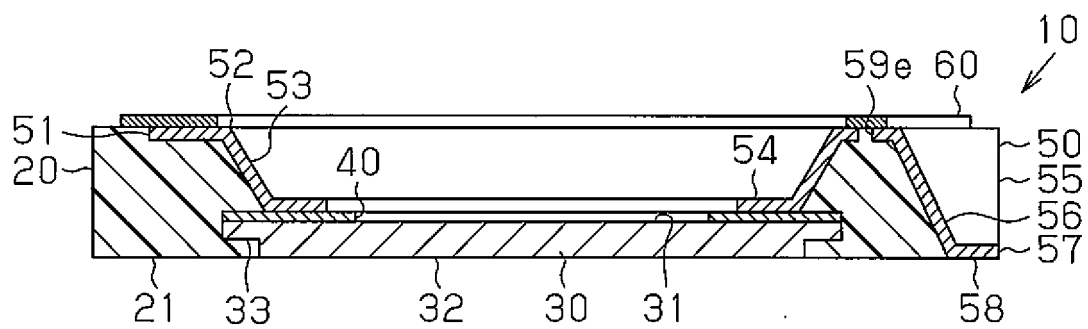


Fig.12



REFERENCES CITED IN THE DESCRIPTION

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